# CHARACTERIZATION REPORT/ RESPONSE ACTION WORK PLAN FORMER JUSTUS COMPRESSOR STATION STARK COUNTY, OHIO



Prepared for

COLUMBIA GAS TRANSMISSION CORPORATION
Environmental Affairs-Remediation
P.O. Box 1273
1700 MacCorkle Avenue, SE
Charleston, West Virginia

Prepared by



Baker Environmental, Inc. Coraopolis, Pennsylvania

### 2.0 ENVIRONMENTAL SETTING

# 2.1 <u>Physical Setting</u>

The Former Justus CS is surrounded by an 8-foot high chain link fence and occupies less than one tenth of an acre in area. A gravel base, overgrown with vegetation, covers the ground surface within the fenced area of the CS. The land surrounding the CS is primarily woodlands with agricultural fields to the north. Topography at the CS is relatively flat for the geographic area with a slight downward sloping to the southeast (i.e., northwest being topographically up gradient and the southeast being topographically down gradient). The CS is at an elevation of approximately 1,040 feet above mean sea level (msl) with the surrounding ridges generally less than 1,200 feet msl (Figure 1-1).

### 2.2 Climate

The geographic area of the portion of Ohio in which the CS is located receives mean annual precipitation of approximately 33 inches. The precipitation is fairly well distributed throughout the year with fall having the least precipitation of the four seasons and late winter/early spring having the most precipitation. Prevailing wind direction is from the south. Temperatures vary widely, with average lows during the winter months reaching 20 degrees Fahrenheit to highs during the summer months reaching 83 degrees Fahrenheit. (Soil Survey of Stark County, Ohio, 1971).

### 2.3 <u>Surface Water Hydrology</u>

The Justus CS is located less than 1,500 feet north of an unnamed, intermittent tributary to Bean Creek, which flows west about 2,000 feet to Sugar Creek (Figure 1-1).

During characterization field activities, it was observed that surface drainage from the CS flows southeast toward a small drainage ditch paralleling the access road (Township Road

303). However, there does not appear to be a defined drainage channel/pathway from the CS toward the access road. In addition, there does not appear to be a defined flow connection between the drainage ditch paralleling the access road and the unnamed tributary to Bean Creek.

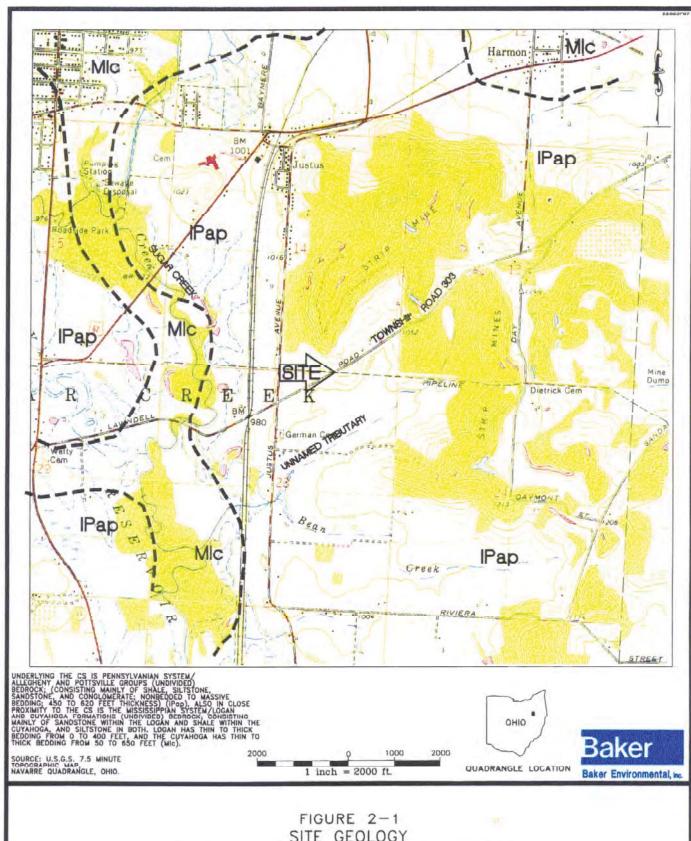
## 2.4 <u>Geology and Soils</u>

The Justus CS is located near the limit of the glaciated part of the Allegheny Plateau Physiographic Province (Figure 2-1). The bedrock in this region is sedimentary in origin and consists predominantly of the Pennsylvanian System/Allegheny and Pottsville Groups. Bedrock in the area consists mainly of shale, siltstone, sandstone, and conglomerate with nonbedded to massive bedding and thicknesses up to 600 feet (ODNR, April 1997).

The Wooster silt loam is the predominant soil in the area. These soils typically are moderately well drained with moderate permeability. (Soil Survey of Stark County, Ohio, 1971). Based on visual observations made during the site characterization, soils consisted predominantly of brown sandy clays with trace gravel. A more permeable clayey sand was observed from approximately 3 to 3.5 feet below ground surface (bgs). This perched water horizon was encountered at this depth in almost all borings advanced for the characterization. Bedrock was not encountered during the characterization activities with the deepest boring advanced to 6 feet bgs.

# 2.5 <u>Hydrogeology and Groundwater Quality</u>

In valley bottoms, useable quantities of groundwater are generally obtained from both shallow wells installed in unconsolidated deposits and wells installed in deeper bedrock formations. In other topographic areas, wells installed in bedrock aquifers or springs are a source of potable water supplies.



SITE GEOLOGY FORMER JUSTUS COMPRESSOR STATION

COLUMBIA GAS TRANSMISSION CORPORATION JUSTUS, OHIO

characterization activities, soil lithologies were documented in the field log book and also recorded onto boring logs. These boring logs are provided within Appendix F of this report.

# 4.3 <u>Analytical Results of Investigative Samples</u>

A summary of methods analyzed for individual PRAs is provided in Table 4-2. For each media (soil, groundwater, etc.) Table 4-3 (Summary of Analytical Results) lists only those constituents for which a valid positive detection was reported by the laboratory for at least one sample at the CS.

Figure 4-1 presents analytical results that exceed the CALs and/or background on the CS base map to facilitate review. The results are discussed by matrix and PRA to facilitate review in the following subsections.

The Comprehensive Analytical Results tables, as prepared by ESi, and sample chain-of-custody forms are included in Appendix B. Columbia maintains a hard copy of all analytical data should additional review be needed.

# 4.3.1 Background Sampling Results

One background soil sample was collected from 1 to 3 feet bgs at three locations believed to not be affected by operations of the compressor station (Figure 4-1) during the initial characterization field activities in May 1997. These three samples were located outside the fence line; northeast, north, and west of the compressor at locations topographically upgradient. All three of these samples were analyzed for Table 1 (CWP) constituents.

The three background samples (JUS-ASB008-70001, JUS-ASB009-70001, and JUS-ASB010-70001), exhibited no detections of SVOCs, or PCBs. However, a low level detection of methylene chloride (.024 mg/kg) was reported in background sample JUS-

Summary of Analytical Results **Table 4-3** 

		PRA	1				8	
		PRA Description	PRA #1-PIPELINE DRIP CISTERN	RIP CISTER	17		PRA #2-COMPRESSOR	)R
		Sample Type	Normal Sample				Normal Sample	
		Sample Id	JUS-ASB001-70001		JUS-ASB002-70001		JUS-ASB003-70001	
		Depth - ft bgs	5.5 - 6		5.5 - 6		0 - 1	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85	ON		ND			
BNA	DIESEL		ND		ND		12	
METAL	BARIUM, TOTAL	5500	98.5		130			
	CHROMIUM, TOTAL	230	10.8 J		19.2 J			
	LEAD, TOTAL	400	QN		ND			
	NICKEL, TOTAL	1600	15.0		21.9			
	ARSENIC, TOTAL	.43	8.5	X	16.9	×		

\* "> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites Page 1 of 7

# Summary of Analytical Results **Table 4-3**

		PRA						
		PRA Description						
		Sample Type						
		Sample Id	JUS-ASB003-70002		JUS-ASB004-70001		JUS-ASB004-70002	
		Depth - ft bgs	1.5 - 2.5		0 - 1		1.5 - 2.5	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85						
BNA	DIESEL		ND		9.1		100	
METAL	BARIUM, TOTAL	5500						
	CHROMIUM, TOTAL	230						
	LEAD, TOTAL	400						
	NICKEL, TOTAL	1600						
	ARSENIC, TOTAL	.43						

Notes:

\* "> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites

Summary of Analytical Results **Table 4-3** 

		PRA						
		PRA Description						
		Sample Type						
		Sample Id	JUS-ASB005-70001		JUS-ASB005-70002		JUS-ASB006-70001	
		Depth - ft bgs	0 - 1		1.5 - 2.5		0 - 1	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85						
BNA	DIESEL		10		99		7.1	
METAL	BARIUM, TOTAL	5500						
	CHROMIUM, TOTAL	230						
	LEAD, TOTAL	400						
	NICKEL, TOTAL	1600						
	ARSENIC, TOTAL	.43						

\* "> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites

Summary of Analytical Results Table 4-3

		PRA			3		4	
		PRA Description			PRA #3-VERTICAL S	SEPARATOR	PRA #3-VERTICAL SEPARATOR PRA #4-BACKGROUND SAMPLE	ND SAMPLE
		Sample Type			Normal Sample		Normal Sample	
		Sample Id	JUS-ASB006-70002		JUS-ASB007-70001		JUS-ASB008-70001	
		Depth - ft bgs	1.5 - 2.5		2.5 - 3		1.3	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85					ND	
BNA	DIESEL		18		ND		30	
METAL	BARIUM, TOTAL	2500					57.5	
	CHROMIUM, TOTAL	230					11.1	
	LEAD, TOTAL	400					ND	
	NICKEL, TOTAL	1600					20.5	
	ARSENIC, TOTAL	.43					8.5	X

\* "> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites Page 4 of 7

Summary of Analytical Results **Table 4-3** 

		PRA					w	
		PRA Description	Š				PRA #5-RANDOM PCB SAMPLES	B SAMPLES
		Sample Type					Field Duplicate (Rep)	
		Sample Id	JUS-ASB009-70001		JUS-ASB010-70001		JUS-ASB012-71001	
		Depth - ft bgs	1-3		1-3		65	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85	0.024		QN			
BNA	DIESEL		ON		5.6			
METAL	BARIUM, TOTAL	5500	81.0		730			
	CHROMIUM, TOTAL	230	12.2		9.4			
	LEAD, TOTAL	400	178		ND			
	NICKEL, TOTAL	1600	161		13.2			
	ARSENIC, TOTAL	.43	135	X	155	X		

# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites

<sup>\* &</sup>quot;> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

Summary of Analytical Results **Table 4-3** 

		PRA						
		PRA Description						
		Sample Type	Normal Sample					
		Sample Id	JUS-ASB011-70001		JUS-ASB012-70001		JUS-ASB013-70001	
		Depth - ft bgs	5 0		5 0		50	
		Result Units	MG/KG		MG/KG		MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*	Result Flag	> CAL*	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85						
BNA	DIESEL							
METAL	BARIUM, TOTAL	2500						
	CHROMIUM, TOTAL	230						
	LEAD, TOTAL	400						
	NICKEL, TOTAL	1600						
	ARSENIC, TOTAL	.43						

\* "> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

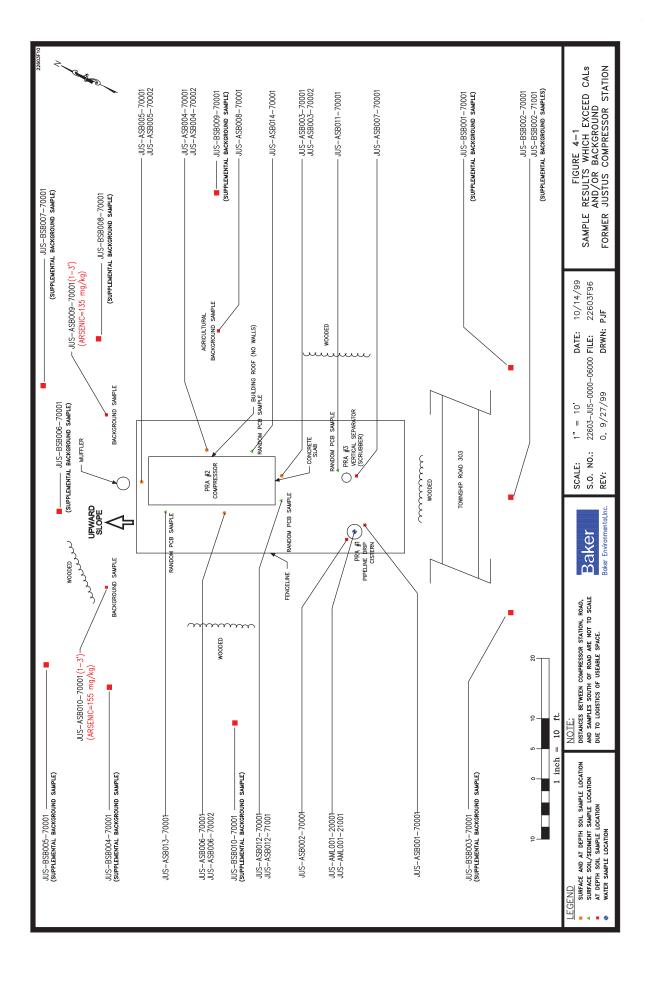
# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites Page 6 of 7

Summary of Analytical Results Table 4-3

		PRA		
		PRA Description		
		Sample Type		
		Sample Id	JUS-ASB014-70001	
		Depth - ft bgs	50	
		Result Units	MG/KG	
Category	Analyte	Action Level	Result Flag	> CAL*
VOA	METHYLENE CHLORIDE	85		
BNA	DIESEL			
METAL	BARIUM, TOTAL	5500		
4	CHROMIUM, TOTAL	230		
	LEAD, TOTAL	400		
•	NICKEL, TOTAL	1600		
	ARSENIC, TOTAL	.43		

\* "> CAL" equals "X" when reported value is above characterization action level for this locale. J flag - Numerical value is an estimated quantity. ND indicates Non-Detect Blank cells in result column indicate an analysis was not performed for that analyte.

# JUSTUS COMPRESSOR STATION Characterization Work Plan Program Sites Page 7 of 7



ASB009-70001. The low level detection of methylene chloride in sample JUS-ASB009-7001 is below the corresponding CAL of 85 mg/kg.

Laboratory analytical results also indicated the presence of various metals at low concentrations below CALs in all three background samples, with the exception of arsenic. Arsenic was detected above CALs in all three background samples with concentrations of 8.5 mg/kg, 135 mg/kg, and 155 mg/kg, respectively. Only the values from JUS-ASB009-70001 and JUS-ASB010-70001 are presented as highlighted on Figure 4-1.

In addition, TPH for Diesel Range Organics (TPH-DRO) was detected in samples JUS-ASB008-70001 and JUS-ASB010-70001 at concentrations of 30 mg/kg and 5.6 mg/kg, respectively. However, during collection of the background samples there was no evidence of soil staining, free product, or elevated PID readings.

It should be noted that the arsenic concentration detected in background samples JUS-ASB009-70001 and JUS-ASB010-70001 (refer to Figure 4-1) were collected from an area that was topographically upgradient and not located adjacent to any compressor station equipment. Samples JUS-ASB009-70001 and JUS-ASB010-70001 were not included in the background comparison because the values are uncharacteristically elevated in comparison to the remaining background sample and at other facilities in Ohio. The soil observed at these background locations differed from that observed in the shallow soil samples collected on-site. This may possibly reflect reworking of the soils on-site when the compressor station constructed or natural variability. However, the arsenic concentration of 8.5 mg/kg at JUS-ASB008-70001 is typical for sites in Ohio and was included in the background calculation for arsenic.

## 4.3.1.1 Supplemental Background Sampling Results

Comments from the USEPA (June 17 and July 6, 1999) on the draft CR (May 1999) exhibited a concern regarding the arsenic concentrations in the three previously-collected background samples. There was a concern that two of the background samples may not be representative of indigenous arsenic concentrations in the geographic area. Therefore, to address these concerns, ten additional background samples (including three quality control samples) were collected for arsenic analysis.

The supplemental background sampling was performed on August 24, 1999. Consistent with previous background sampling, the ten supplemental background samples were collected from 1 to 3 feet bgs in areas surrounding the site not believed to have been impacted from previous compressor station operations (see Figure 4-1). Arsenic was detected in all ten supplemental background samples with concentrations ranging from 7.2 mg/kg in sample JUS-BSB008-70001 to 18.2 mg/kg in sample JUS-BSB004-70001.

As provided in the CWP (June 1996), the highest concentration of a constituent detected in the background samples, or the value calculated in Appendix G, is used to establish the background concentration for this constituent at the CS. The calculated background value for arsenic (CBVA) was 17.0 mg/kg, as presented in Appendix G in the draft CR. This value was used to evaluate the results of the remaining PRAs. However, with a new CBVA of 23.34 mg/kg (see Appendix G for calculation worksheet), there appears to be no change to the anticipated remedial activities warranted at the site. Therefore, the two previously-collected background samples (JUS-ASB009-70001 and JUS-ASB010-70001) that exhibited elevated arsenic concentrations (135 mg/kg and 155 mg/kg, respectively) appear not to be representative of arsenic levels observed in indigenous soils in the geographic area. Response actions to these two samples are provided in Section 6.0 of this report.

### 4.3.2 Random PCBs Sampling Results

One random PCB soil sample was collected from 0 to 6 inches bgs at four locations within the limits of compressor station operations. These four samples (JUS-ASB011-70001, JUS-ASB012-70001, JUS-ASB013-70001, and JUS-ASB014-70001) were collected at random locations to confirm that PCB containing oils had not been released. All four of these soil samples had no detection of PCB constituents.

### 4.3.3 Water Sampling Results

### PRA #1 Pipeline Drip Cistern

One water sample (JUS-AML001-20001) and a quality control duplicate sample (JUS-AML001-21001) were collected from the concrete Pipeline Drip Cistern (PRA #1). Laboratory analytical results of the water samples indicated no evidence of SVOC, PCB, TPH for Gasoline Range Organics (TPH-GRO), or metal constituents. However, methylene chloride was detected in both samples at concentrations of 19 ug/L and 28 ug/L, respectively. Methylene chloride is commonly utilized by analytical laboratories as a solvent for such uses as equipment preparation (i.e., cleaning of glassware). It is not uncommon to have residual methylene chloride detected in environmental samples analyzed by analytical laboratories. In addition, TPH-DRO also was detected in both samples at estimated concentrations of 400 ug/L and 440 ug/L, respectively. However, during sample acquisition there were no elevated PID readings and a sheen was not present on the water within the cistern.

### 4.3.4 Soil Potential Release Areas

# PRA #1 Pipeline Drip Cistern

One hand auger boring was advanced on two sides of the cistern to a depth of six feet bgs (two borings total). One subsurface soil sample was collected from each boring at a depth

of 5.5 to 6 feet bgs. Soil samples were collected east of the cistern (JUS-ASB001-70001) and west of the cistern (JUS-ASB002-70001)

Laboratory analytical results indicated no evidence of VOCs, SVOCs, PCBs, and TPH. However, some metals were detected in both soil samples below CALs with the exception of arsenic. Arsenic was detected in both soil samples at concentrations of 8.5 mg/kg and 16.9 mg/kg, respectively. However these concentrations are below the CBVA of 17.0 mg/kg.

### PRA #2 Compressor

One hand auger boring was advanced adjacent to each of the four sides of the Compressor to a depth of 2.5 feet bgs (four borings total). A surface soil sample (0 to 1 feet bgs) and a subsurface soil sample (1.5 to 2.5 feet bgs) was collected at each location, boring numbers JUS-ASB003, 004, 005, and 006.

Laboratory analytical results of all eight soil samples indicated no evidence of BTEX or PCB constituents. However, TPH-DRO constituents were detected in seven of the eight samples. Only sample JUS-ASB003-70002 had no detection of TPH-DRO constituents. The seven remaining soil samples reported TPH-DRO concentrations of 12 mg/kg, 9.1 mg/kg, 100 mg/kg, 10 mg/kg, 66 mg/kg, 7.1 mg/kg, and 18 mg/kg, respectively. There was no evidence of soil staining, free product, or elevated PID readings observed during sample collection.

### PRA #3 Vertical Separator

One hand auger boring was advanced to a depth of 5 feet bgs adjacent to the Vertical Separator with one subsurface soil sample (JUS-ASB007-70001) being collected from the 4 to 5 feet bgs interval. Laboratory analytical results of the subsurface soil sample indicated no evidence of BTEX, PCB, or TPH constituents.

# APPENDIX F

# Test Boring Logs

# TEST BORING RECORD

Baker Environm	nental	į.									
PROJECT:	Site (	Character	ization at	Columbia (	Gas Tra	nsmissi	on - Former Just	us Comp	ressor S	tation	
SO NO.:		3-JUS				ORING	NO.:	PRA1-J	Boring A		
COORDINAT						ORTH:			4		
ELEVATION:	SURI	FACE:			T	OP OF I	PVC CASING:				
Rig: Geop	robe		A second		T		1	T			Depth to
	MC	Casing	Augers	Core	D	ate	Progress	1	Weathe	er	Water
	Liners			Barrel			(Ft.)		00000 W 00000 000 000 000	Ī	(Ft.)
Size (ID)	1-5/8" I.D.				5/21/	97	0.0 - 6.0				
Length	4.0 feet										
Туре											
Hammer Wt.					1						
Fall											
Remarks: Co	oncrete Cis	tern (Tab	le 1-CWP	)							
		MPLE TY					WELL	INFOR	MATIO		
			A = Auger				TT		D:	Top	Bottom
	T = Shelb R = Air B		V = Wash C = Core				Type		Diam.	Depth (Ft.)	Depth (Ft.)
	D = Deni		P = Piston		-				27877 24	(Ft.)	(FL)
		= No Sam			-						
	Sample	Sample	pic	PID	-	-			l v	'ell	Elevation
Depth (Ft.)	Type &	Rec.	Lab ID	(ppm)	1	V	isual Description	1	1 66	llation	(Ft. MSL)
Dopin (11.)	No.	(Ft.,%)	Zau Zz	(PPAA)			isuur 2 vsoripuos	54		tail	(2 1. 1.202)
		(= ==, = )					ARRESPENSED. BY				
1								-	111		
									]		
2											
	N							_			
3					١.			_		_	
, -							erched groundwa	ater at _		_	
4 —					~	3.5'		-		-	
5 - 5.0					C	ictorn -	5.5' deep	5.0		-	
3 - 3.0	S-1		JUS-ASB-	0.0			SAND; brown;			<del>-</del>	
6 6.0	D-1		001-70001	0.0	- 1		t above)	6.0		_	
			001.0001				Boring at 6.0'				
7 7	e e							=		-	
								-	111	-	
8 7											
								794			
9 _											
								5-			
10											
									لللا		
								(b) (4)			

DRILLING CO.: Subsurface, Inc. BAKER REP.: (b) (4) SHEET 1 OF 1 BORING NO.: PRA1-Boring A DRILLER:

# TEST BORING RECORD

Baker Environmental

PROJECT: SO NO.:	_		zation at 0	Columbia (	BORING	NO :		Boring B	tation	-
COORDINAT	-	3-JUS			NORTH:		PKA1-I	Soring B		
ELEVATION:		FACE:		***************************************		PVC CASING:				
Rig: Geop	MC	Casing	Augers	Core	Date	Progress		Weathe	er	Depth to Water
ai an	Liners			Barrel	5/04/07	(Ft.)	+			(Ft.)
Size (ID)	1-5/8" I.D.				5/21/97	0.0 - 6.0	-			
Length	4.0 feet			7 <b></b>						
Type Hammer Wt.										
Fall	***									
	oncrete Cis	tern (Tab	le 1-CWP	1-1/2						
	SAN	MPLE TY	/PE	***		WELL	INFOR	MATIO	N	
			= Auger						Top	Bottom
	T = Shelb	•				Type	77	Diam.	Depth	Depth
	R = Air I		C = Core				1531		(Ft.)	(Ft.)
	D = Deni		P = Piston							
		No Sam	ple	nm l				77	ell	Elevation
Depth (Ft.)	Sample Type &	Sample Rec.	Lab ID	PID (ppm)	, v	isual Description			llation	(Ft. MSL)
Depth (Ft.)	No.	(Ft.,%)	Lau ID	фин	'	isuai Description			etail	(I't. WISL)
	110.	(2 (1,70)				3773378				
1							•		-	1
					Ì		9			]
2 _ ]							_			
	N						2-		_	
3					1 2 22				_	
					1.70	erched groundw	ater at _		_	
4 —					~ 3.5'		-		_	
5 - 5.0		8			Cistorn	5.5' deep	5.0		-	
5 5.0	S-1		JUS-ASB-	0.0		SAND; brown;			_	1
6 6.0	5-1		002-70001	0.0	moist (we		6.0		-	
-   0.0			332 70001			f Boring at 6.0'	0.0		_	1
7							_		_	1
					- 1		-			]
8					1				_	
					ı		<u></u>		_	
9 _							-		_	
10 -							-		-	
10							10		-	
							(b) (4)			
DRILLING CO		urface, In	C.			BAKER REP.:	(b) (4)		OT TO	70 1 OF 1
DRILLER:	(b) (4	7				BORING NO.:	PRA1-B	oring B	SHEE	T 1 OF 1

# \$701700

# **TEST BORING RECORD**

Baker Environmental

PROJEC	T:	Site (	Character	ization at	Columbia	Gas	Transmiss	ion - Former Jus	tus Comp	oressor S	tation	
SO NO .:		2260	3-JUS	An Alminotati			BORING	NO.:	PRA2-	Boring A		
COORD	INAT	ES: EAS	Γ:				NORTH:					**
ELEVA	TION	SURI	FACE:				TOP OF	PVC CASING:				
Dia	Coor	roho.				-γ-	100000	I morning				D41-4-
Rig:	Geor	MC	Casing	Augona	Core	-	Data	Dungung	l l	Wastha		Depth to
		500000000000000000000000000000000000000	Casing	Augers			Date	Progress	ľ	Weathe	er	Water
G: GD		Liners			Barrel	_	04/07	(Ft.)				(Ft.)
Size (ID)	)	1-5/8" I.D.				5/	21/97	0.0 - 5.0				
Length		4.0 feet				+						
Туре						+						
Hamme	r Wt.		(			-						
Fall												
Remark	s: C	ompressor	(BTEX, T	TPH, PCBs	5)							2.
		SAN	MPLE T	YPE				WELL	INFOR	MATIO	N	
2		S = Split	Spoon A	A = Auger							Top	Bottom
		T = Shelb	y Tube \	V = Wash				Type		Diam.	Depth	Depth
		R = Air F	Rotary	C = Core				3			(Ft.)	(Ft.)
		D = Deni	son I	P = Piston			2000					
		N=	No Sam	ple								
THE STATE OF THE STATE OF		Sample	Sample		PID					W	'ell	Elevation
Depth (	(Ft.)	Type &	Rec.	Lab ID	(ppm)		l v	isual Description	n		llation	(Ft. MSL)
12.4	` '	No.	(Ft.,%)		41 /						tail	( /
		S-1	( )	JUS-ASB-	0.0		GRAVEI	LY SAND, trac	e clav			
1	1.0	2772/1/2011		003-70001						1	-	1 1
-	1.5	N					1		-	1111		1 1
2 -		S-2		JUS-ASB-	0.0		1		_		_	1
_	2.5			003-70002			i		_			1
3							Water fro	om 3.0' to 3.5' (C	lavev -		-	
-	1 1	N					Sand; bro	The second secon			-	1
4 -	4.0							,	4.0		_	1
_		N				_	SANDY	SILTY CLAY; b			_	1
5	5.0						plastic		5.0		-	1
								f Boring at 5.0'		1111	. <del></del>	1
6 -	1						. Bottom o	Doring at 5.0	-	1111	-	1 1
-	1								_	1111	-	1 1
7 -	1								-		_	i i
-	1										-	1 1
8 -	1								-		-	1
"-	1			3			1		_		-	
9 -	1 1		1						_		-	1 1
′ –	1		1				1		-		-	1
10	1 1								-		-	1
1 10 -	1 1								_		-	
									(b) (4)			
		D.: Subsu	ırface, Inc	0.				BAKER REP.:				
DRILLE	R:	(b) (4)						BORING NO.:	PRA2-B	oring A	SHEE	T 1 OF 1

# TEST BORING RECORD

Rak	(er	Fnvi	ironmen	tal

Right   Geoprobe   Casing   Augers   Core   Barrel   Core   Barrel   Core   Barrel   Core	PROJECT SO NO.: COORD: ELEVAT	INAT	22603 ES: EAST	з <b>-</b> JUS	ization at (	Columbia	Gas 7	BORING NORTH:			Boring B	tation	
Size (ID)	Rig:	Geop	MC	Casing	Augers	10	1	Date			Weath	er	
Length Type	Size (ID)	)	1-5/8" I.D.		-		5/2	21/97					
Hammer Wt. Fall	Length		4.0 feet										
Compressor (BTEX, TPH, PCBs)	Type												
SAMPLE TYPE   S	Hammer	r Wt.						CIII DONNO					
Sample   Type   Semple   Sample   Sample   Semple   Sem	Fall												
S = Split Spoon	Remark	s: Co	(2)	3 S	10 A	)							
T = Shelby Tube   W = Wash   R = Air Rotary   C = Core	(54):400(4):400		-		- Contract C				WELL	INFOR	MATIO		
R = Air Rotary								11. 11. 11. 11. 11. 11. 11. 11. 11. 11.			1000		
Depth   F   Depth   Depth   F   Depth   Depth   F   Depth   Depth   F   Depth   Depth   F   Depth   Depth   F   Depth   Depth   F   Depth   Depth   F   Depth   F   Depth   F   Depth   Dept									Type		Diam.	0.73	100
Depth (Ft.   Sample   Type & Rec.   Lab ID   (Ppm)   Visual Description     Well   Installation   (Ft. MSL)												(Ft.)	(Ft.)
Depth (Ft.)   Sample   Type & Rec.   Lab ID   (ppm)   Visual Description   Well   Installation   Detail   Ft. MSL													
Type & Rec. No. (Ft.%)   No.	- Jak				ple				-				
No.   (Ft.%)	95 3					.,		Late to					
1	Depth (	(Ft.)	0.000		Lab ID	(ppm)		V	isual Descriptio	n			(Ft. MSL)
1				(Ft.,%)					and lamin.		De	etail	
2			S-1		JUS-ASB-	0.0		GRAVEI	LLY SAND, trac	e clay _			
2 _ 2.5	1				004-70001					8		0.00	
2.5 004-70002 Water at 3.0'  4		1.5	N							_		1700-1	
3 _	2		S-2		JUS-ASB-	0.0				100.00			
4 4.0 N 4.0 Sottom of Boring at 4.0'  5 _		2.5			004-70002					-		8=	5028
4 4.0 4.0 Bottom of Boring at 4.0'  5 _ 6 _ 7 _ 7 _ 8 _ 7 _ 9 _ 7 _ 10 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _	3							Water at	3.0'				
5			N							20			
5	4	4.0			8					4.0		_	1
6 _ 7 _ 7 _ 8 _ 7 _ 9 _ 7 _ 10 _ 7 _ 10 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _ 7 _								Bottom o	f Boring at 4.0'			_	1
7 _	5	1								_			ĺ
7 _		1		1						65.00			1
	6 _							N.		-		_	
	7 _									_		_	
	8 _									_		_	
	9 -									3		_	
	10	]			3					-		-	
The state of the s									-	(b) (4)			

DRILLING CO.: Subsurface, Inc.

DRILLER: BORING NO.: PRA2-Boring B SHEET 1 OF 1

# B)s ((s))

# TEST BORING RECORD

PROJECT:   Site Characterization at Columbia Gas Transmission - Former Justus Compressor Station
Rig:   Geoprobe
MC   Liners   Liners   Liners   Core   Barrel   Progress   Weather   Water (Ft.)
Size (ID)
Type
Remarks: Compressor (BTEX, TPH, PCBs)   SAMPLE TYPE   S = Split Spoon A = Auger   T = Shelby Tube W = Wash   R = Air Rotary C = Core   D = Denison   P = Piston   N = No Sample   Sample   Sample   Sample   Sample   Sample   Sample   No. (Ft.,%)   JUS-ASB- 0.0 (Ft.,%)   JUS-ASB- 0.0   O05-70001   J.5   N   S-2   JUS-ASB- 0.0   O05-70002   J.5   N   Water at 3.1'   Water at 3.1'
SAMPLE TYPE   SERIES   Series   Sample   Sample   Depth (Ft.)   Type & Rec.   No. (Ft.,%)   No. (F
Remarks: Compressor (BTEX, TPH, PCBs)    SAMPLE TYPE
SAMPLE TYPE   S = Split Spoon A = Auger   T = Shelby Tube W = Wash   R = Air Rotary C = Core   D = Denison P = Piston   N = No Sample   Type & Rec. Lab ID (ppm)   Visual Description   Detail
S = Split Spoon
T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample  Depth (Ft.)   Sample Sample Type & Rec.   Lab ID (ppm)   Visual Description  No. (Ft.,%)   S-1   JUS-ASB- 0.0   GRAVELLY SAND, trace clay   005-70001    1.5   N   2   2.5   S-2   JUS-ASB- 0.0   005-70002    3   Water at 3.1'
R = Air Rotary
D = Denison   P = Piston   N = No Sample   Sample   Sample   Type & Rec.   Lab ID   (ppm)   Visual Description   Detail   Installation   Detail
N = No Sample
Depth (Ft.)   Sample   Type & Rec.   Lab ID   (ppm)   Visual Description   Installation   (Ft. MSL   Installation   Installa
Depth (Ft.)         Type & Rec. No. (Ft.,%)         Rec. Lab ID (ppm)         Visual Description         Installation Detail         (Ft. MSL Detail)           1         1.0         S-1         JUS-ASB- 0.0 005-70001         GRAVELLY SAND, trace clay 005-70001         —           2         1.5         N         —         —           2         S-2         JUS-ASB- 0.0 005-70002         —         —           3         Water at 3.1'         —         —
No. (Ft.,%)  1
1 1.0 S-1 JUS-ASB- 0.0 GRAVELLY SAND, trace clay
2
2 S-2
3
3 Water at 3.1'
4 4.0 4.0
Bottom of Boring at 4.0'
5
$^{\circ}$ $\rightarrow$ $\downarrow$
· -           -   -   -
8 7 1 1 1 1 1 1 1 1 1 1

DRILLING CO.: Subsurface, Inc.

DRILLER:

BAKER REP.: (b) (4)

BORING NO.: PRA2-Boring C SHEET 1 OF 1

# **TEST BORING RECORD**

Baker En	vironn	nental											
PROJEC				ization at	Columbia	Gas '		on - Former Just				tation	
SO NO.:			3-JUS		<u> </u>		BORING	NO.:	PRA2-	Boring	D		
		ES: EAS					NORTH:						
ELEVA	ΓΙΟΝ	SURI	FACE:				TOP OF	PVC CASING:	10-10-10-10-10-10-10-10-10-10-10-10-10-1				
Rig:	Geor	orobe	I a . · · ·			T	D. 4		T	XX7			Depth to
		MC Liners	Casing	Augers	Core Barrel		Date	Progress (Ft.)		Weat	ne	r	Water (Ft.)
Size (ID	)	1-5/8" I.D.				5/2	21/97	0.0 - 4.0					
Length		4.0 feet					7						
Type													
Hamme	r Wt.												
Fall						┸							
Remark	s: C	ompressor	(BTEX, T	TPH, PCBs	5)								+:
			MPLE T					WELL	INFOR	MATI	01	V	
				A = Auger								Top	Bottom
				W = Wash			1	Type		Dian	1.	Depth	Depth
1		R = Air I						175-02				(Ft.)	(Ft.)
		D = Deni		P = Piston									
			No Sam										
		Sample	Sample		PID					1	W	100 P 100 P	Elevation
Depth (Ft.)		Type &	Rec.	Lab ID	(ppm)		Visual Description		Detail		lation	(Ft. MSL)	
			(Ft.,%)					Det			tail		
		S-1		JUS-ASB-	0.0		GRAVEL	LY SAND, trace	e clay _		1	<u>_</u>	
1_	1.0			006-70001					-		-		
275	1.5	N							95545	111	1	120,178	
2 _		S-2		JUS-ASB-	0.0						- 1	20000	
	2.5			006-70002							-		C 162
3							Water at 3	3.1'					
		N					1		16-35		1	ALC:	
4	4.0								4.0		1	1,570	
							Bottom of	Boring at 4.0'			1		
5 _									-		1	1 <u>12 - 3</u> 52	
											1		
6 _							2				1		
_		1							_		1	_	
7	1								8				
_									_		1	7_	
8									87				
_		į į							_				
9 _									-				
												_	

DRILLING CO.:		BAKER REP.:	(b) (4)	
DRILLER:	(b) (4)	BORING NO.:	PRA2-Boring D	SHEET 1 OF 1

# Sal (6)

10 \_

# TEST BORING RECORD

Baker Environn	nental	Ì									
PROJECT: SO NO.:		Character 3-JUS	ization at	Columbia	a Gas '	Transmiss BORING	ion - Former Jus NO.:		oressor S Boring A		
COORDINAT	ES: EAS	Γ:				NORTH:					
ELEVATION	SURI	FACE:				TOP OF	PVC CASING:	11/			
Rig: Geor	robe				Т		2 1820 H	T	125	-	Depth to
	MC Liners	Casing	Augers	Core Barre		Date	Progress (Ft.)		Weath	er	Water (Ft.)
Size (ID)	1-5/8" I.D.				5/2	21/97	0.0 - 3.0		2000		
Length	4.0 feet							3 5 5 5 5			
Туре											
Hammer Wt.							a light of the				
Fall									20000		
Remarks: V	ertical Scru	ibber (BT	EX, TPH,	PCBs)							
	SAN	MPLE TY	YPE				WELL	INFOR	MATIO	N	- #G
	S = Split					87/27/				Тор	Bottom
	T = Shelb		V = Wash			1	Type		Diam.	Depth	Depth
	R = Air I		C = Core				65.5			(Ft.)	(Ft.)
	D = Deni		P = Piston								
		= No Sam		. ,							
	Sample	Sample		PID		400	201 240221 021030		2000	/ell	Elevation
Depth (Ft.)	Type &	Rec.	Lab ID	(ppm)		V	isual Description	and the second and the second			(Ft. MSL)
	No.	(Ft.,%)							De	etail	-
1								_		-	-
'-	N							_		_	
2 -	14							1			1
2 - 2.5								0		-	-
3 3.0	S-1		JUS-ASB-	0.0		Water at	3.0'	3.0		-	
	5-1		007-70001	0.0			f Boring at 3.0'	3.0	111	-	1
4			007-70001			Dottom o	1 Dornig at 3.0	· ·	{	:-	1
										l -	1
5								-		n-	1
								-		_	1
6						45		-		-	1
		1								) <del>, (1), (1), (1), (1), (1), (1), (1), (1)</del>	1
7 7	8							_		-	1
	5							2		_	1
8	8							-		_	1
								-			
9 ]										_	

DRILLING CO.: Subsurface, Inc.

DRILLER:

BAKER REP.: (b) (4)

BORING NO.: PRA3-Boring A SHEET 1 OF 1

# TEST BORING RECORD

Baker Environmental

PROJECT:	Site (	Character	ization at	Columbia	Gas Transm	ission - Former Jus	tus Com	pressor S	Station		
SO NO.:		3-JUS	0.220			NG NO.:		Boring A			
COORDINAT	ES: EAS	T:			NORT	H:					
ELEVATION	: SURI	FACE:	Onto a case		TOP (	OF PVC CASING:	8				
Rig: Geor	rohe				T	· I · · · · · · ·			88==0	Depth to	
rig. deo	MC	Casing	Augers	Core	Date	Progress	1	Weather		Water	
	Liners	Onong	11ugers	Barrel	) Date	(Ft.)		vv cath		(Ft.)	
Size (ID)	1-5/8" I.D.				5/21/97	0.0 - 3.0					
Length	4.0 feet				1		1				
Type											
Hammer Wt.			5 <b></b> 5					1000 1000 1000 1000 1000 1000 1000 100			
Fall									allo-s-		
Remarks: Ba	ackground	(Table 1-	CWP)							-	
200		***			4.00						
		MPLE TY		-13025		WELL	INFOR	MATIO	N		
			A = Auger						Top	Bottom	
	T = Shelb	*			Ì	Type		Diam.	Depth	Depth	
	R = Air I		C = Core						(Ft.)	(Ft.)	
	D = Deni		P = Piston			107			7.10		
		No Sam	ple								
Donath (Tt)	Sample	Sample	TID	PID					/ell	Elevation	
Depth (Ft.)	Type &	Rec.	Lab ID	(ppm)		Visual Descriptio	n	26.00 (C.O.) (C.O.)	llation	(Ft. MSL)	
	No.	(Ft.,%)		-	_			De	tail		
1 1.0	14			1 1			10		D=		
1 - 1.0		-		$\vdash$	CII TV	CLAY; brown; da	1.0				
2	S-1		JUS-ASB-	0.0	moist	CLAT, blown, da	p to _		_	{	
~ -	5-1		008-70001	0.0	moisi		-				
3 7 3.0			000-70001	1			3.0		) -		
	7:				Botton	of Boring at 3.0'	5.0			1	
4 7							-		-		
-							-				
5							-		_		
							2.		-	1	
6									_		
7		6									
									_		
8 —					j						
9 -							-		19		
9					5		-				
10									(a-		
10-									<del></del>		
		928 999			- L	Vicential Science II	(b) (4)	$\perp$			
DRILLING CO		rface, Inc	). 			BAKER REP.:	(b) (4)				
DRILLER:	(b) (4)					BORING NO.:	PRA4-B	oring A	SHEE	T 1 OF 1	

# Bak(e)

DRILLER:

# **TEST BORING RECORD**

SHEET 1 OF 1

BORING NO.: PRA4-Boring B

PROJECT:			ization at	Columbia			on - Former Just			tation	
SO NO.:		3-JUS				RING	NO.:	PRA4-I	Boring B		
COORDINAT						RTH:					
ELEVATION	: SURI	FACE:			TO	P OF F	VC CASING:				
Rig: Geor	MC Liners	Casing	Augers	Core Barrel	Dat	te	Progress		Weath	er	Depth to Water
Cine (TD)	1-5/8" I.D.				E /04 /07	7	(Ft.)	-			(Ft.)
Size (ID)					5/21/97	4	0.0 - 3.0	-			
Length	4.0 feet				-	-1		+			
Туре			- <del></del>			$\rightarrow$					
Hammer Wt.					+						
Fall											
Remarks: Ba	ackground	(Table 1-	CWP)			g=1				120 U 20	ž.
	SAN	MPLE T	YPE				WELL	INFOR	MATIO	N	
į.	S = Split	Spoon A	A = Auger							Top	Bottom
	T = Shelb	y Tube \	W = Wash		8		Type		Diam.	Depth	Depth
	R = Air I	Rotary	C = Core				15.61			(Ft.)	(Ft.)
	D = Deni	son I	P = Piston		l d						
	N=	No Sam	ple								
	Sample	Sample		PID			*****		W	ell	Elevation
Depth (Ft.)	Type &	Rec.	Lab ID	(ppm)		Vi	sual Description			llation	(Ft. MSL)
- 4	No.	(Ft.,%)	2000 200	(47)			sum Description			tail	(1 (. 14101)
	N N	(1 1.,70)						-		tan	
1 1.0	**							$1.\overline{0}$		-	
1 - 1.0				10000	SII.	TV CI	AY; brown; dar			0-	
2	S-1		JUS-ASB-	0.0	moi		AI, blowii, uai	пр ю –		-	
-	5-1			0.0	inoi	St		-		-	
1 , -1 , 0			009-70001					2 2		_	
3 3.0								3.0			
. 4					Bott	om of	Boring at 3.0'	_		_	
4								_			
										<u></u>	
5								_			
6	23										
			ĝ.					910.02			
7											
			1								1
8					1			1.77		-	
										_	
9 7 1								٦		_	
								-		-	
10								=		-	
Secretary (								_		-	
DDW 1 2 2 2 2						-		(b) (4)			
DRILLING CO	J.: Subsu	irface, Inc	0.			1	BAKER REP.:	(b) (4)			

DRILLER:

# **TEST BORING RECORD**

BORING NO.: PRA4-Boring C

SHEET 1 OF 1

SO NO.:		3-JUS	MONTH A		BORING	sion - Former Jus G NO.:		Boring C		
COORDINAT	ES: EAS	T:	9 000		NORTH	:				
ELEVATION	: SURI	FACE:		915	TOP OF	PVC CASING:	-0 198			
Rig: Geop	MC Liners	Casing	Augers	Core Barrel	Date	Progress (Ft.)		Weath	er	Depth to Water (Ft.)
Size (ID)	1-5/8" I.D.				5/21/97	0.0 - 3.0				
Length	4.0 feet									
Туре							92.00			
Hammer Wt.							1			
Fall							1			
Remarks: B	ackground	(Table 1-	CWP)							
		-								
300	-	MPLE TY				WELL	INFOR	MATIO	N	
	S = Split								Top	Bottom
	T = Shelb					Type		Diam.	Depth	Depth
	R = Air I								(Ft.)	(Ft.)
	D = Deni		P = Piston							
		No Sam	ple	prp. I						
Depth (Ft.)	Sample	Sample	T als ID	PID	١,	r		0.000	ell	Elevation (Ft. MSL)
Depth (Ft.)	Type &	Rec.	Lab ID	(ppm)		Visual Description			Installation Detail	
	No.	(Ft.,%)						De	tail	
1 1.0	14				-		1.0		-	
1 1.0				-	SILTY	LAY; brown; da				
2	S-1		JUS-ASB-	0.0	moist	LAT, Olowii, da	p to _		-	1
~ -	0.1		010-70001	0.0	litoist		-		:	}
3 3.0			010-70001	. 1			3.0		-	43
					Bottom o	of Boring at 3.0'	5.0		-	
4					potton.	Doing at 5.0	-		-	
_			ŝ		-		-		-	
5							-		-	
					ł		_	111	_	1
6				1	e.		_		. =	
					ľ			111	-	8
7 _										
					1		-			
8 _										
		l i					2			
9 _									0.000	
									_	
10							_			

# Worksheet for Site Specific Calculated Background Value for Arsenic (CBVA) Determination

### APPENDIX G

# WORKSHEET FOR SITE-SPECIFIC CALCULATED BACKGROUND VALUE FOR ARSENIC (CBVA)

# FORMER JUSTUS COMPRESSOR STATION

### I. BACKGROUND CALCULATION

# Arsenic Results in Background Samples

- a = 10.9 mg/kg b = 12.0 mg/kg c = 10.8 mg/kg d = 18.2 mg/kg e = 10.4 mg/kg f = 8.7 mg/kg g = 10.8 mg/kg h = 7.2 mg/kg i = 10.6 mg/kg j = 17.1 mg/kg
- n = number of sample results

# Background Value For Arsenic Calculation

[ 
$$A + B + C + ..... + J/n$$
] x 2 = Calculated Background Value for Arsenic (CBVA)  
[  $(10.9 + 12.0 + 10.8 + 18.2 + ..... + 17.1)/10$ ] x 2 = CBVA  
( $(116.7/10)$  x 2 = CBVA  
11.67 x 2 = CBVA

# 23.34 mg/kg = CBVA

## II. COMPARISON TO HIGHEST BACKGROUND RESULTS

CBVA vs. Highest Background Result

23.34 mg/kg vs. 18.2 mg/kg

# SITE SPECIFIC CALCULATED BACKGROUND VALUE FOR ARSENIC (CBVA) = 23.34 mg/kg

\*Note: Calculations based on: "Data Collection and Evaluation, Human Health Risk Assessment Bulletin, No. 2, Supplemental Guidance to RAGs," Office of Technical Services, U.S. EPA Region IV, October 1996